ASPHALT EMULSION SURFACE TREATMENT DESCRIPTIONS

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The asphalt binder in asphalt concrete will harden and become brittle through the action of air, sun, and water. With time, this results in aggregate loss or raveling and ultimately cracking of the asphalt pavement with failure occurring. Asphalt emulsion surface treatments are excellent for preventing the development of early pavement damage or distress. The surface treatment seals the pavement and ages or hardens instead of the more expensive asphalt concrete under it.

Preventative maintenance programs started early in the life of a pavement (1-3 years) provide the protection needed to greatly improve service life. For aged pavements, surface treatments can delay the costs of major reconstruction.

The following are descriptions of various surface treatments available. For additional and more detailed information, please refer to the AEMA Recommended Performance Guidelines.

FOG SEAL

Fog seals consist of a spray of diluted asphalt emulsion applied to the surface of asphalt concrete. Unlike other surface treatments with spray applications, no aggregate cover is used with fog seals. Because there is no aggregate, the emulsion application rate is very low to prevent tackiness and a major decrease in skid resistance. The emulsion is diluted for better control of the application rate at the low levels involved. Anionic and cationic slow setting type emulsions are typically used for fog seals.

Fog seals are effective if started early in the pavement life with repeat applications needed at appropriate intervals. The asphalt pavement must be structurally sound with only minor loss of fine aggregate from the surface.

ADVANTAGES: Protects good pavements by putting an asphalt rich film on surface to seal voids and is inexpensive.

LIMITATIONS: Typically has a short life. On aged pavements, other types of surface treatments should be considered.

SLURRY SEAL

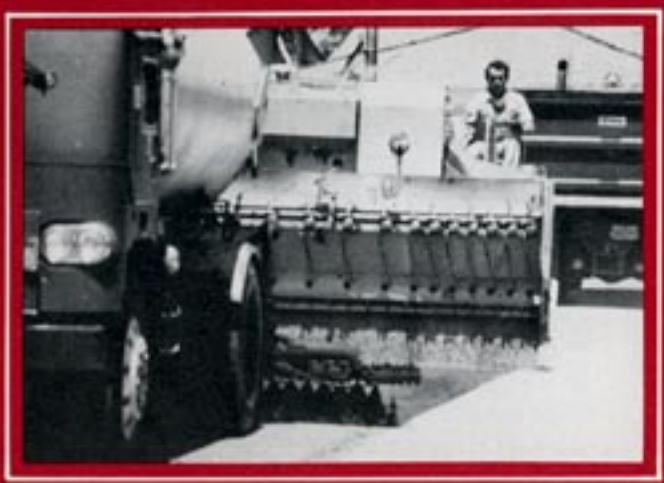
Slurry seals are a blend of emulsion, aggregate, water, and additive. These components are proportioned and mixed together in special equipment on the job site and immediately placed on the paved surface. A curing period is necessary before allowing traffic on the slurried surface.

Since slurry seal is a blend of emulsion and aggregate, the finished product has the appearance of a fine graded asphalt mixture.

There are three types of slurry seal with different applications appropriate for each one. They primarily differ by the gradation or size of the aggregate used. There is typically a longer service life as the aggregate size increases. Anionic and cationic slow setting and quick setting type emulsions are used for slurry seals.

ADVANTAGES: Has a dark and smooth surface with minimal effect on pavement profile. A clean construction operation. Slurry seals can be placed in cooler weather than chip seals.

LIMITATIONS: Longer cure time than chip seals. In warm weather 2 hours is typical however in cool weather 6-12 hours is possible. Careful design procedures must be followed.



CHIP SEAL

Chip seals consist of a spray application at a high rate of asphalt emulsion followed immediately by an application of aggregate (chips). Aggregate sizes range from sand (for a sand seal) up to ¾".

This type of surface treatment can consist of multiple or repeated applications with 2 being referred to as double and 3 a triple chip seal. On low traffic unpaved roads or streets, chip seals can be used as the surface or wearing course. An asphalt prime coat is usually placed on the unpaved surface before the chip seal application.

Chip seals can be the most economical or cost effective of the various surface treatments considering their service life versus cost. Anionic and cationic rapid setting type emulsions are the most commonly used asphalts for chip seals with medium setting type less frequently selected. Polymer modified emulsions are also used.

ADVANTAGES: Can be opened to controlled traffic relatively quickly. Also has improved skid resistance with a long service life possible.

LIMITATIONS: Excess loose aggregate that must be swept up to avoid broken windshields and other vehicle damage. Problems can develop with aggregate retention (stick) with this mostly occurring when chip seal construction is completed during cooler climatic conditions. Work should be done in warm weather.

SANDWICH SEAL

A sandwich seal uses many similar construction procedures to those involved in a normal chip sealing operation. However, instead of the asphalt emulsion being applied first, one course of large aggregate is spread followed by the emulsion application and then a second course of smaller aggregate. With the asphalt application in the middle, there from comes the term "sandwich."

Aggregate cleanliness is absolutely essential in this type of surface treatment.

ADVANTAGES: An increased service life which is typically the same as a double chip seal. Unlike the regular double seal, only one application of emulsion is required.

LIMITATIONS: A clean aggregate is definitely required.

MICRO-SURFACING

Micro-surfacing is a polymer modified quick traffic slurry seal system. Because of the quick cure time and polymer modification, micro-surfacing can be placed in much greater thickness than is possible for conventional slurry seal. This characteristic allows its use as an alternative to hot mix asphalt for the filling of ruts and for some other corrective maintenance applications.

ADVANTAGES: The quick curing times which allow traffic on the surface very soon after application. Thicker applications result in improved or greater service life.

LIMITATIONS: The special equipment needed and the higher cost.

CAPE SEAL

A cape seal is a chip seal which is covered with a thin slurry seal application. This surface treatment was originally developed in the Cape Province of South Africa and so the term "cape".

This combined application technique typically results in a surface treatment with very long service life.

ADVANTAGES: Provides a dense, tight surface with improved skid resistance and long service life.

LIMITATIONS: A longer construction time is required. Has a higher cost.

The descriptions of asphalt emulsion surface treatments presented are intended as a guide to briefly explain the treatments available. It is not intended as a selection guide since there are other factors to consider in determining the most appropriate application. For further information please consult the Recommended Performance Guidelines published by the AEMA or contact the local AEMA member company.

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